Imagine COMMUNICATIONS

User's Manual

iPhone® Codec

for SelenioFlex™ Ingest

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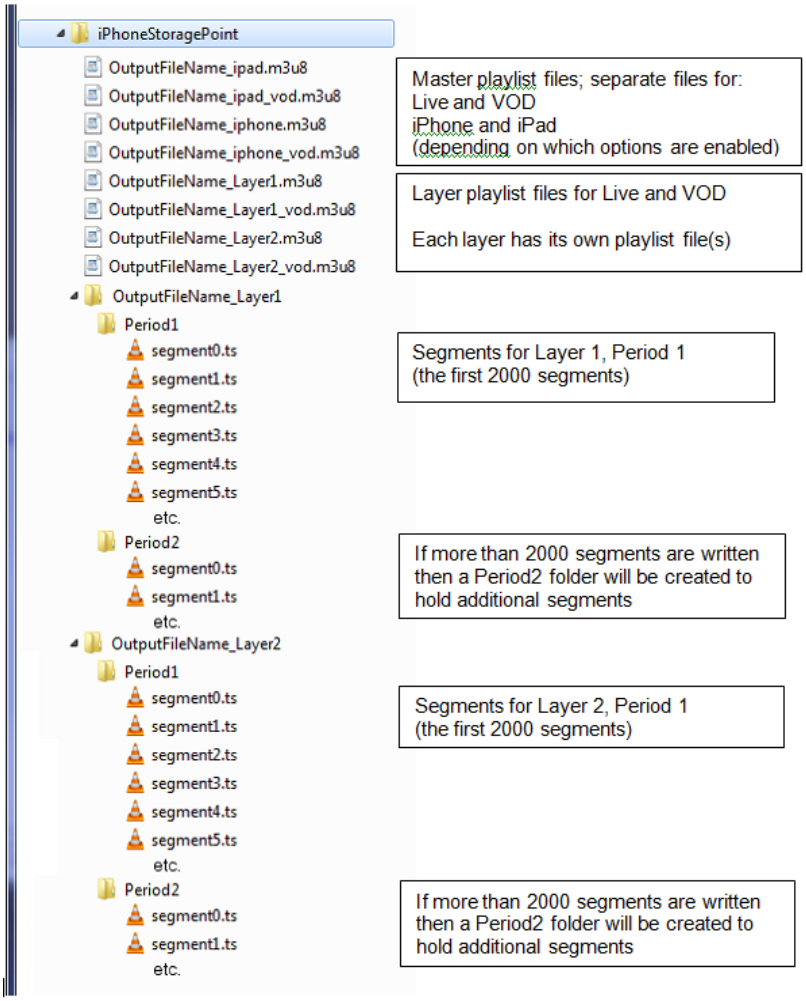
iPhone®/iPad® Codec

This codec outputs encoded transport stream files that contain AVC/H.264 video and AAC audio. The codec seamlessly outputs a new transport stream file at a set duration (the segment duration) for each data rate stream (or layer). It also outputs the playlist files (m3u8 index files) that contain a list of the file segments. The master playlist files are used to initiate playback on an iPhone, iPod Touch or iPad.

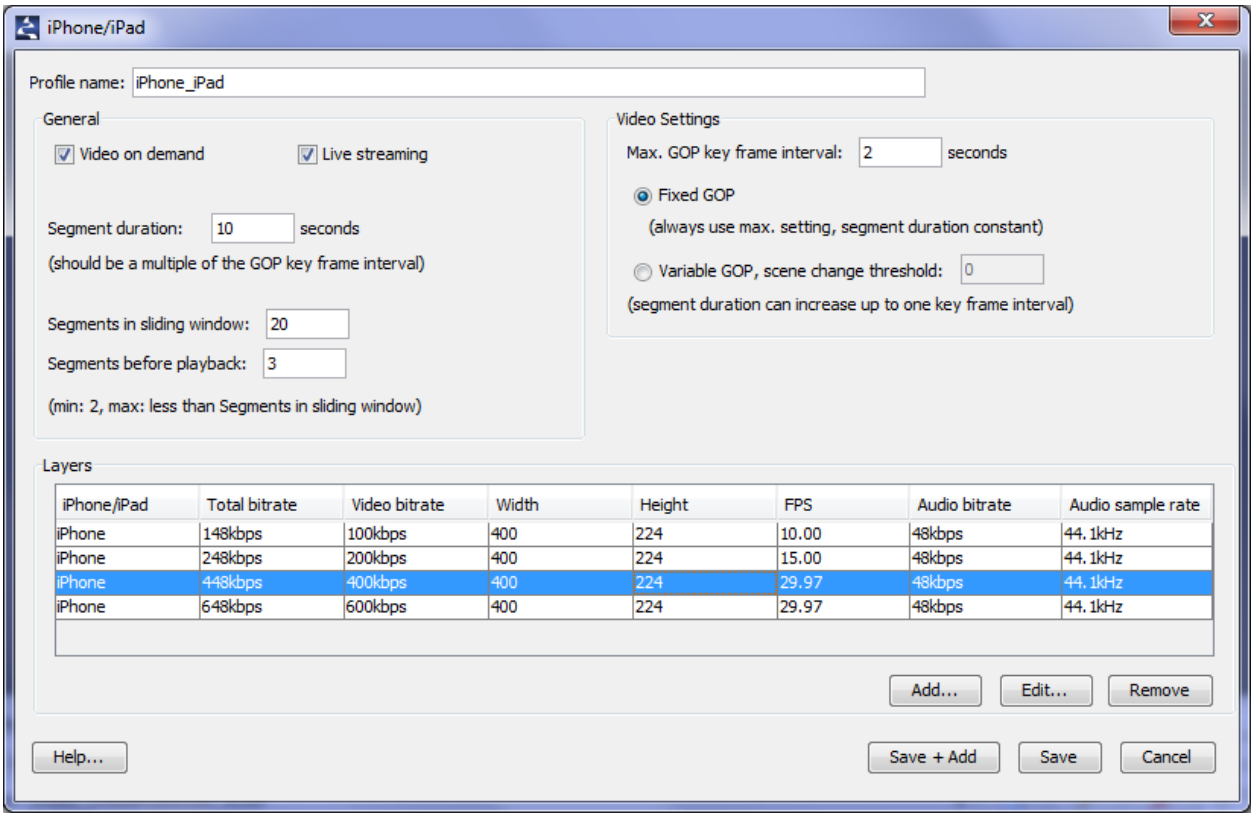
For example, for 2 layers the following files would be output (with a few segments shown per layer as a representation in the following example):



The output files need to be delivered from the SelenioFlex Ingest encoder to a standard HTTP web server. The segments are delivered to the player using the standard HTTP protocol. This method of delivering media is known as HTTP Live Streaming, or HLS.

The player gives viewers a link to the master playlist file, normally from an html page that contains a link to the playlist file. The player reads the playlist file, requests the transport stream files in order, and plays them without any pauses or gaps between the segments. The player also monitors the effective bandwidth to the web server, and if the conditions change then the next time it downloads a segment it will switch to a higher quality segment or lower quality segment as appropriate (if it is available).

Codec Settings


iPhone/iPad
Profile name: iPhone_iPad
General
Video on demand
Live streaming
Segment duration: 10 seconds
(should be a multiple of the GOP key frame interval)
Segments in sliding window: 20
Segments before playback: 3
(min: 2, max: less than Segments in sliding window)
Video Settings
Max. GOP key frame interval: 2 seconds
Fixed GOP
(always use max. setting, segment duration constant)
Variable GOP, scene change threshold: 0
(segment duration can increase up to one key frame interval)
Layers
iPhone/iPad | Total bitrate | Video bitrate | Width | Height | FPS | Audio bitrate | Audio sample rate
iPhone | 148kbps | 100kbps | 400 | 224 | 10.00 | 48kbps | 44.1kHz
iPhone | 248kbps | 200kbps | 400 | 224 | 15.00 | 48kbps | 44.1kHz
iPhone | 448kbps | 400kbps | 400 | 224 | 29.97 | 48kbps | 44.1kHz
iPhone | 648kbps | 600kbps | 400 | 224 | 29.97 | 48kbps | 44.1kHz
Add...
Edit...
Remove
Help...
Save + Add
Save
Cancel

General Settings

Video on Demand: When this is enabled the playlist files for VOD will be written. These files have "vod" appended to their name, for example, OutputFileName_iphone_vod.m3u8. These VOD playlist files are only written at the end of the encode.

Note that the transport stream media segments are the same for VOD and for Live Streaming. If you enable both options, only one set of transport stream media segments will be written.

Live Streaming: When this is enabled the playlist files (m3u8 files) for live will be written. These files are written during the encode, and as new transport stream media segments are created the playlist files are updated.

Note that the transport stream media segments are the same for VOD and for Live Streaming. If you enable both options, only one set of transport stream media segments will be written.

Segment Duration: This is the target duration of each transport stream media file. If the Fixed GOP setting is used this duration will be exact. If the Variable GOP setting is used then the segment duration may increase by up to one key frame interval.

Segments in Sliding Window/Segments before Playback: When you enable Live Streaming the "Segments in sliding window" and "Segments before playback" fields are also enabled. The "Segments

before playback" number is the number of transport stream media segments that must be written before the first playlist file will be written. The "Segments in sliding window" number is the number of segments that will be referenced in the playlist file. If you are only doing live encoding (and not VOD) all segments outside of the sliding window will be deleted once they are no longer referenced in the playlist file.

Video Settings

These settings allow you to set the GOP structure that will be used by all layers.

Max. GOP Key Frame Interval: This is the maximum time between I-frames (in seconds).

Fixed GOP: If you select fixed GOP then the time between key frames will always be exactly the maximum GOP key frame interval.

Variable GOP: If you select variable GOP, you will need to set the scene change threshold (0 – 100, with 35 as a good starting value). In this case scene changes are detected and an I-frame is inserted when a scene change is detected. The maximum key frame interval will also insert an I-frame if a scene change has not been detected within that time.

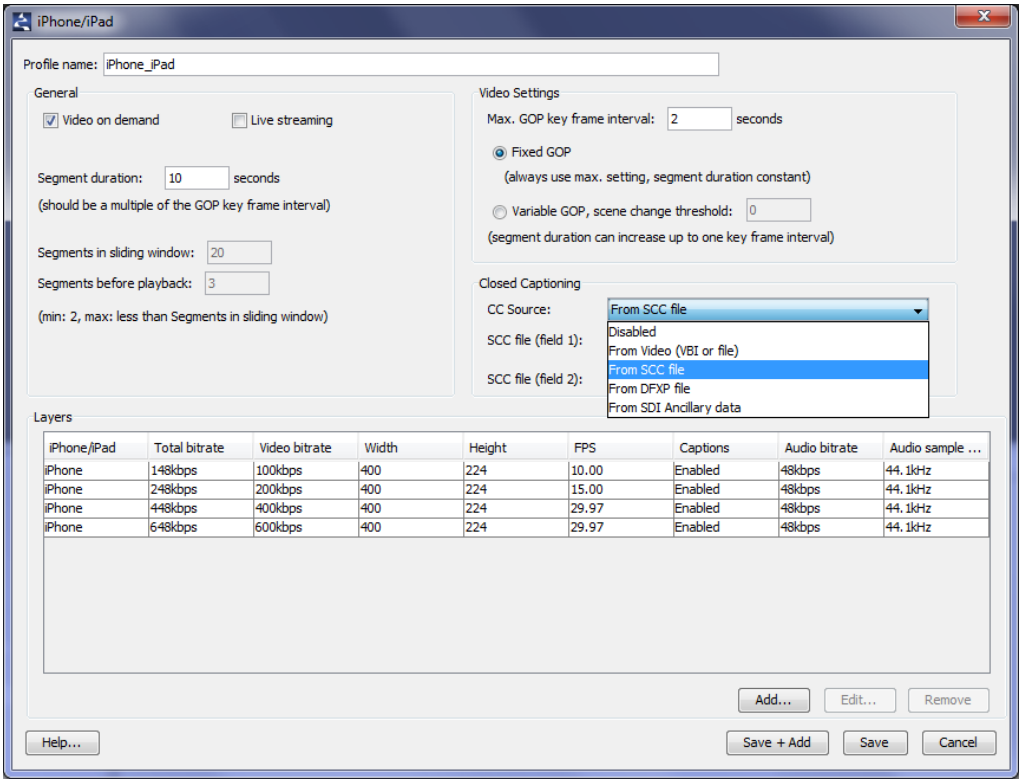
For fast moving footage enabling this setting will improve video quality.

Closed Captioning

To add 608/708 closed captioning select a cc source using the drop-down box:

- Disabled
- From Video (VBI or File)
- From SCC file
- From DFXP file
- From SDI ancillary data

When the close captioning feature is enabled it will embed the captioning into all layers in the iPhone\iPad codec by default. There is a "Captions" column in the Layers table that tells you whether or not the captions are enabled or disabled for each layer.


iPhone/iPad
Profile name: iPhone_iPad
General
Video on demand
Live streaming
Segment duration: 10 seconds
(should be a multiple of the GOP key frame interval)
Segments in sliding window: 20
Segments before playback: 3
(min: 2, max: less than Segments in sliding window)
Video Settings
Max. GOP key frame interval: 2 seconds
Fixed GOP
(always use max. setting, segment duration constant)
Variable GOP, scene change threshold: 0
(segment duration can increase up to one key frame interval)
Closed Captioning
CC Source: From SCC file
SCC file (field 1):
SCC file (field 2):
Disabled
From Video (VBI or file)
From SCC file
From DFXP file
From SDI Ancillary data
Layers
iPhone/iPad | Total bitrate | Video bitrate | Width | Height | FPS | Captions | Audio bitrate | Audio sample ...
iPhone | 148kbps | 100kbps | 400 | 224 | 10.00 | Enabled | 48kbps | 44.1kHz
iPhone | 248kbps | 200kbps | 400 | 224 | 15.00 | Enabled | 48kbps | 44.1kHz
iPhone | 448kbps | 400kbps | 400 | 224 | 29.97 | Enabled | 48kbps | 44.1kHz
iPhone | 648kbps | 600kbps | 400 | 224 | 29.97 | Enabled | 48kbps | 44.1kHz
Add...
Edit...
Remove
Help...
Save + Add
Save
Cancel

Disabled: This feature will disable the closed caption embedding.

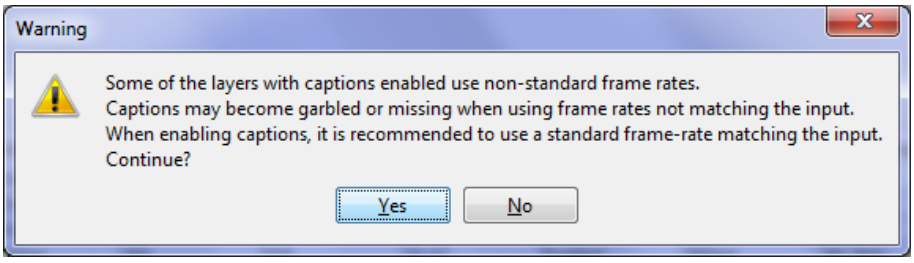
Video (VBI or File): The 608 closed captions that are detected in the video input's VBI, or the closed captions that can be extracted from a video source file.

SCC file: An SCC file is a 608 closed captioning file. When you choose this option you will see 2 SCC file input options, one for field 1 and a second for field 2. For iPhone/iPad captions only use the field 1 option, as these devices cannot display an alternate closed captioning track.

DFXP file: A DFXP file is a 608/708 closed captioning file.

SDI Ancillary data: If you are capturing video using an SDI input, and you are using a Flux board or a DRC-5650 board, then you can use the SDI Ancillary data as the source of closed captioning.

Closed Captioning data uses the frame rate of the input (live video or file source frame rate). If you have layers that use a frame rate that does not match the input frame rate, then when you attempt to save the codec profile you will see the following warning:


Warning
Some of the layers with captions enabled use non-standard frame rates.
Captions may become garbled or missing when using frame rates not matching the input.
When enabling captions, it is recommended to use a standard frame-rate matching the input.
Continue?
Yes
No

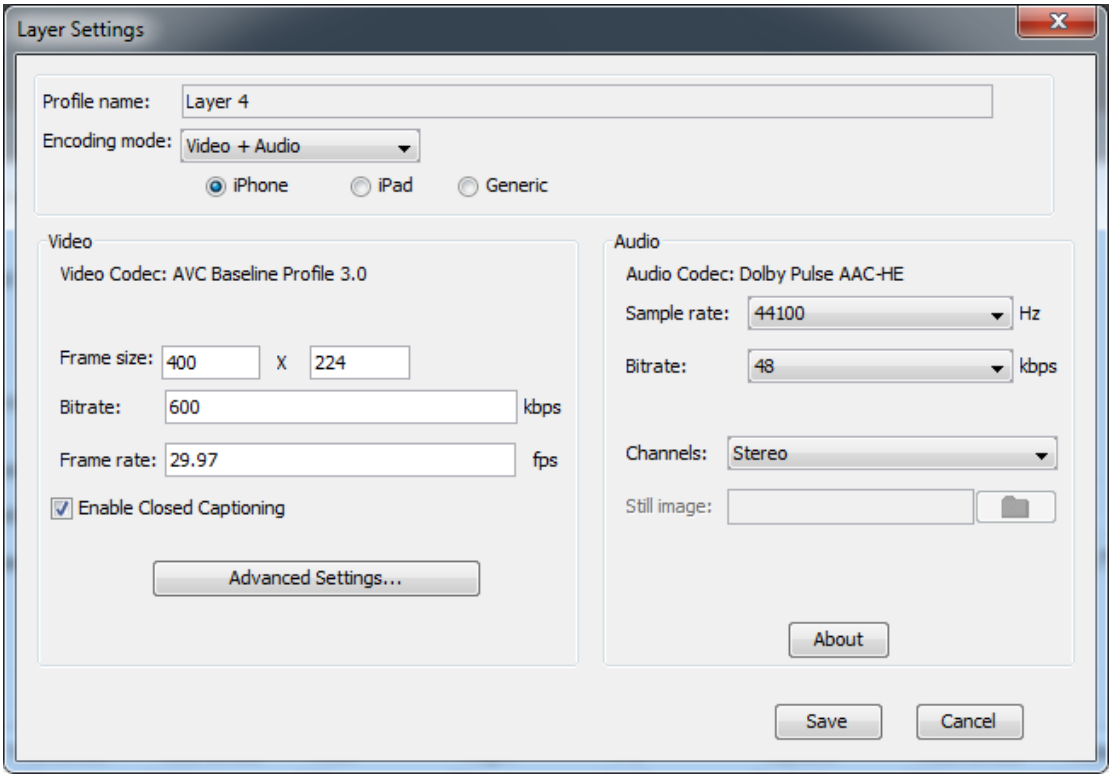
If you would like to disable the closed captioning for layers that do not use the standard frame rate, then you can edit those layers individually.

Layers

When you create an iPhone codec profile it will open showing 4 default layers. You may select a layer and then click the Edit or Remove buttons to change the layer.

Note that if some layers use the iPhone settings and others use the iPad settings then two sets of playlist files will be created. One set will only include the iPhone layers (for playback on an iPhone or iPad) and the other set will include both the iPhone and iPad layers (for playback on an iPad only).

You can add a new layer by clicking the Add button. If you click the Add or Edit button the Layer Settings window will open.



Encoding Mode: You can encode Video + Audio layers, Audio only layers, or Video only layers.

iPhone or iPad or Generic: The video codec is the AVC codec.

- iPhone: Video codec is AVC will use Baseline profile level 3.0
- iPad : Video codec is AVC Main profile level 3.1
- Generic: Video codec Profile and Level selections can be made using drop-down fields

Note that the iPhone 3GS and earlier models can only play back Baseline profile, Level 3.0 (or less for some models). iPad 1 and iPhone 4 can play back Main profile. iPad 2 and iPhone 4S can play back High profile.

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Video

Specify the Frame size.

Specify the bitrate in kbps.

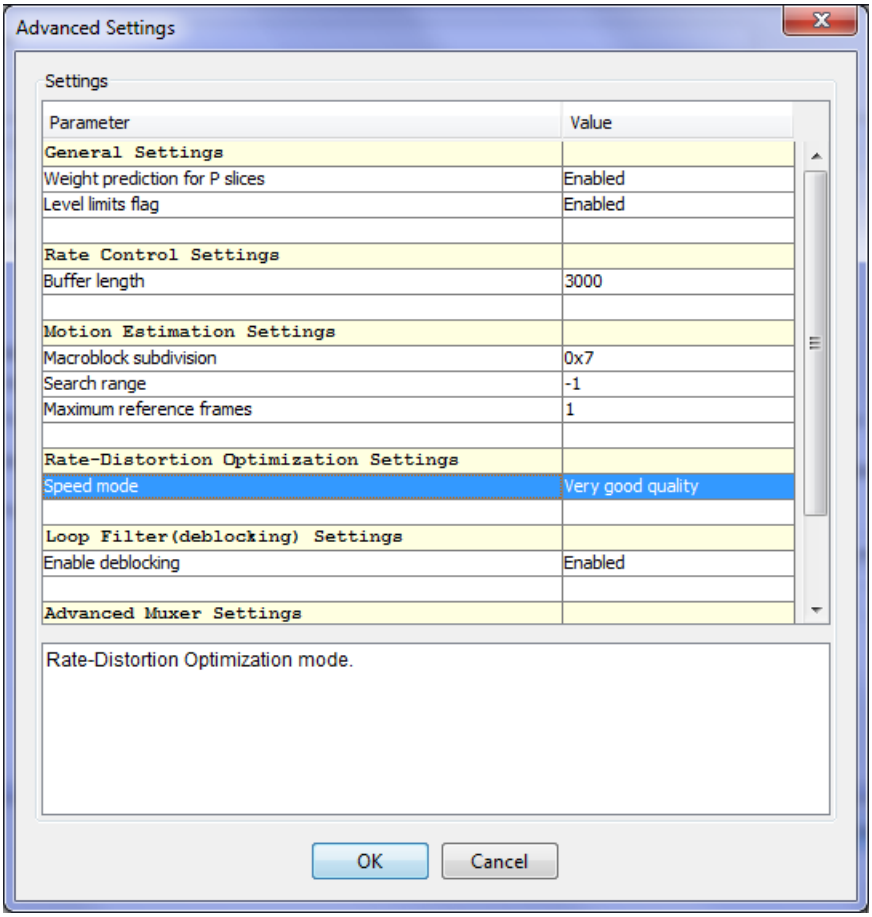
Specify the frame rate in frames per second (fps).

For recommended video settings from Apple please see "Technical Note TN2224", in particular the "Encode your Variants" section.

When the closed captioning CC Source is enabled on the main dialog, then each layer's "Enable Closed Captioning" option will be enabled by default. You can disable the closed captioning option in a layer by unchecking the "Enable Closed Captioning" box.

Advanced Settings

Click the Advanced Settings button to see additional AVC settings. In general you will not have to modify these settings to get good results. When you select a setting a short description of the setting will appear in the pane at the bottom of the window. Click the value to modify the setting.



Audio

The audio codec used is the Dolby Pulse AAC-HE codec.

Select an audio sample rate. Note that lower bit rates are available if you select 32000 Hz.

Select a bitrate. Note that the lower bit rates will not include the Dolby Pulse ID metadata. These are the bit rates that are marked with an asterisk. This will not affect playback on an iPhone or iPad.

Select the number of channels, mono or stereo. Note that lower bit rates are available if you select mono.

It is recommended that you use the same audio bitrate and sample rate for all layers. It is possible to encode using different audio bitrates and sample rates for different layers, however, this will result in a slight pause in playback when the player switches between different layers.

Still Image: If this is an Audio Only layer then the Still Image field will be enabled so that you can choose a jpg image to include in the audio only segments.

Nielsen ID3 Plugin

The Nielsen ID3 Plugin extracts ID3 tags from the watermarked audio source and then embeds the extracted tags into a private stream in the HLS (iPhone/iPad) output format.

Inputs

Both file based and live inputs are supported; for live inputs, both SDI and IP are supported. The input must be uncompressed (PCM) audio with Nielsen ID3 tags present in one of mono, stereo, or 5.1 media sources.

The software assumes that the Nielsen ID3 tags are present in the audio source as follows:

a. Mono – The Nielsen ID3 tags are assumed to be present in the L channel for a mono source
b. Stereo – The Nielsen ID3 tags are assumed to be present in the L channel for a stereo source
c. 5.1 – The Nielsen ID3 tags are assumed to be present in the L and C channels for a 5.1 source

Note: The Nielsen ID3 plugin can only be used within the iPhone/iPad Codec in SelenioFlex Ingest.

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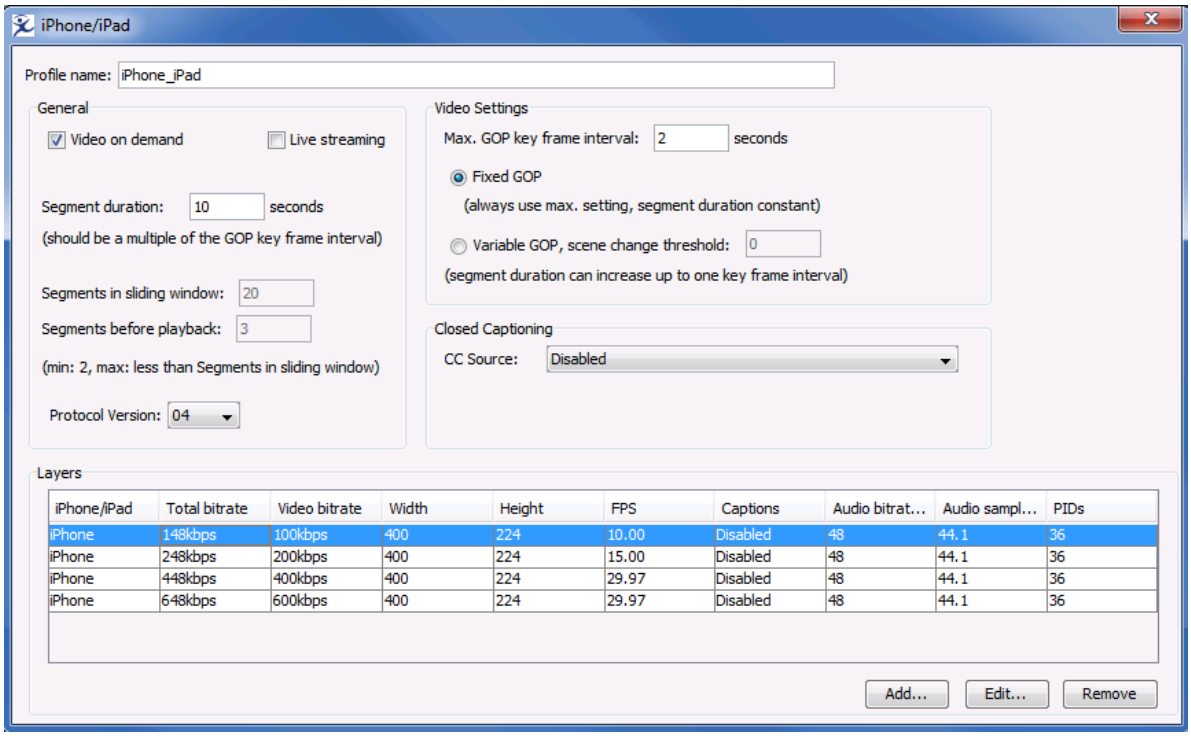
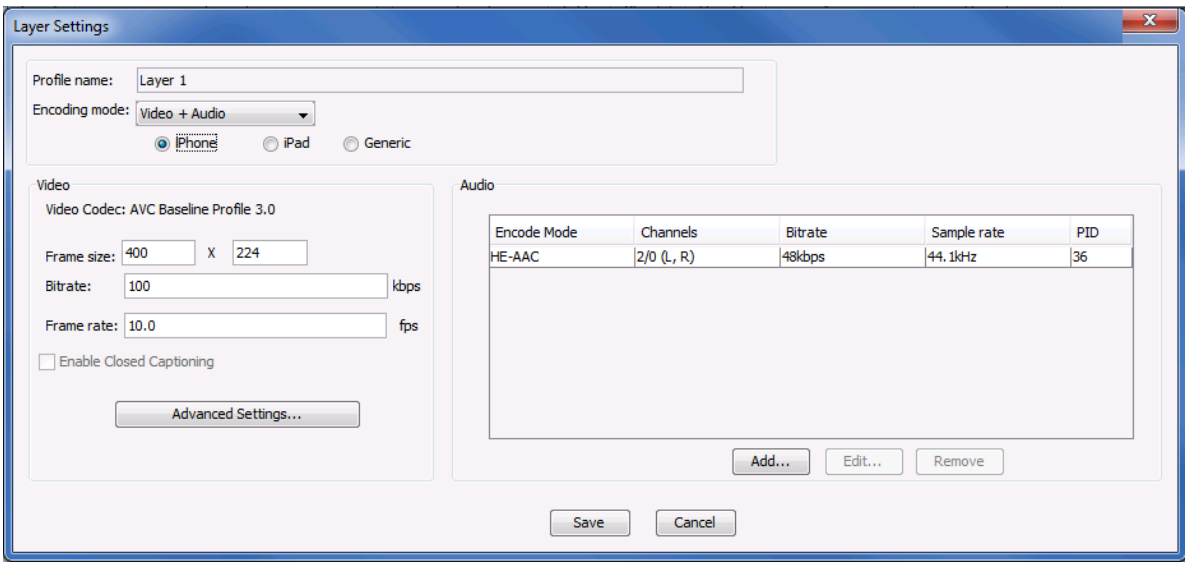
Enabling Nielsen ID3 Tags

1. Launch the **iPhone/iPad** Codec from the **Code Profile** menu.
2. Select the **Layer** to enable for Nielsen ID3 watermarking. Nielsen watermarking can only be added to layers that include both Video and Audio. Click the **Edit** button.

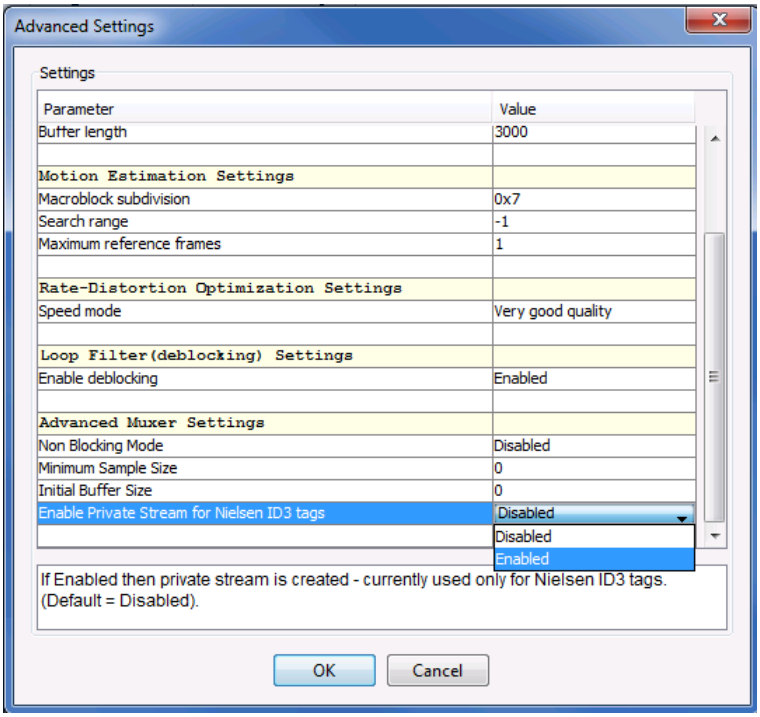

iPhone/iPad
Profile name: iPhone_iPad
General
Video on demand
Live streaming
Segment duration: 10 seconds
(should be a multiple of the GOP key frame interval)
Segments in sliding window: 20
Segments before playback: 3
(min: 2, max: less than Segments in sliding window)
Protocol Version: 04
Video Settings
Max. GOP key frame interval: 2 seconds
Fixed GOP
(always use max. setting, segment duration constant)
Variable GOP, scene change threshold: 0
(segment duration can increase up to one key frame interval)
Closed Captioning
CC Source: Disabled
Layers
iPhone/iPad | Total bitrate | Video bitrate | Width | Height | FPS | Captions | Audio bitrat... | Audio sampl... | PIDs
iPhone | 148kbps | 100kbps | 400 | 224 | 10.00 | Disabled | 48 | 44.1 | 36
iPhone | 248kbps | 200kbps | 400 | 224 | 15.00 | Disabled | 48 | 44.1 | 36
iPhone | 448kbps | 400kbps | 400 | 224 | 29.97 | Disabled | 48 | 44.1 | 36
iPhone | 648kbps | 600kbps | 400 | 224 | 29.97 | Disabled | 48 | 44.1 | 36
Add...
Edit...
Remove

3. In the **Layer Settings** dialog, click the **Advanced Settings** button.



If the **Advanced Settings** button is not available, make sure the Encoding Mode is set to **Video + Audio** (which is the required mode for Nielsen watermarking).

4. In the Advanced Settings, go to the bottom of the dialog and set **Enable Private Stream for Nielsen ID3 tags** to **Enabled**.



5. Click **OK** and then click **Save** on the Layer Settings dialog.
6. Repeat this process to enable Nielsen ID3 tags on all required layers and **Save and Add**.

Configuring Nielsen ID3 Tags

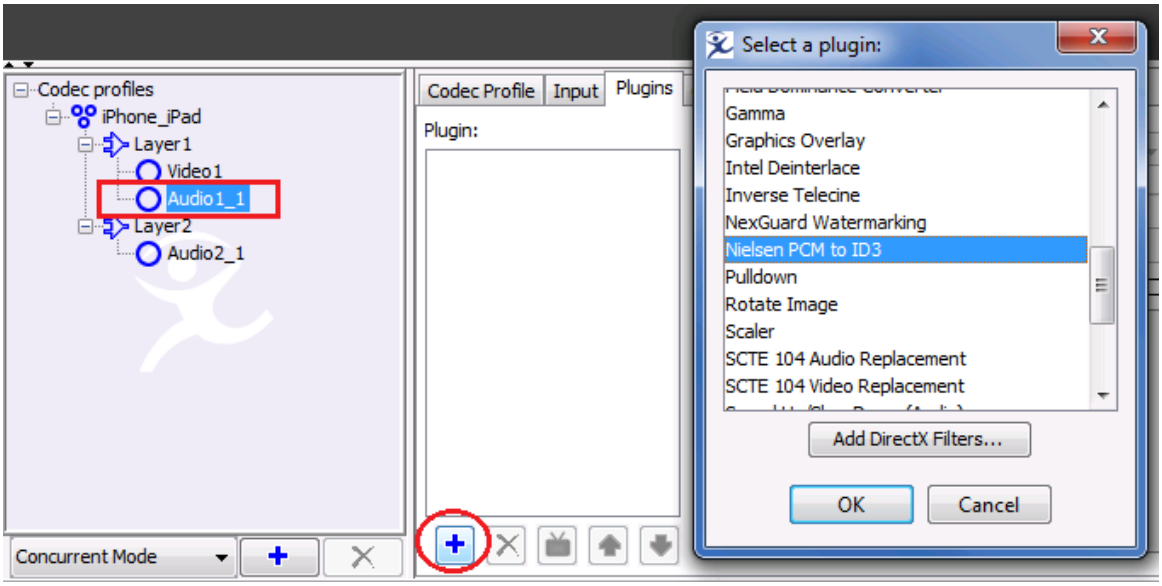
In the **Codec profiles** area of your SelenioFlex Ingest interface, you will see details for the Codec Profile added, along with the layers.

Nielsen ID3 needs to be configured at the **Audio** level for the Layers it was enabled on. The **Nielsen PCM to ID3** Plugin, once enabled for a layer, can be selected by clicking the **Audio** portion of a layer and going to the **Plugins** tab.

To configure:

1. In the **Codec profiles** area, select an **Audio** layer
2. Go to the **Plugins** tab

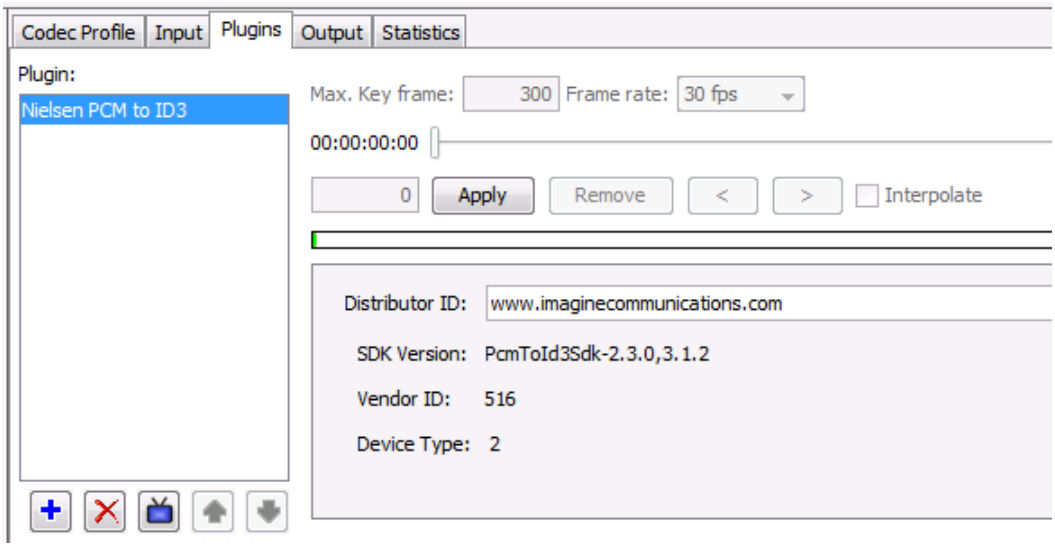
3. Click the blue + button at the bottom of the **Plugin** area and select the **Nielsen PCM to ID3** Plugin. Click **OK**.



4. In the **Distributor ID** field, enter the URL/Domain Name of the company or entity operating the device, for example, www.<yourcompany>.com

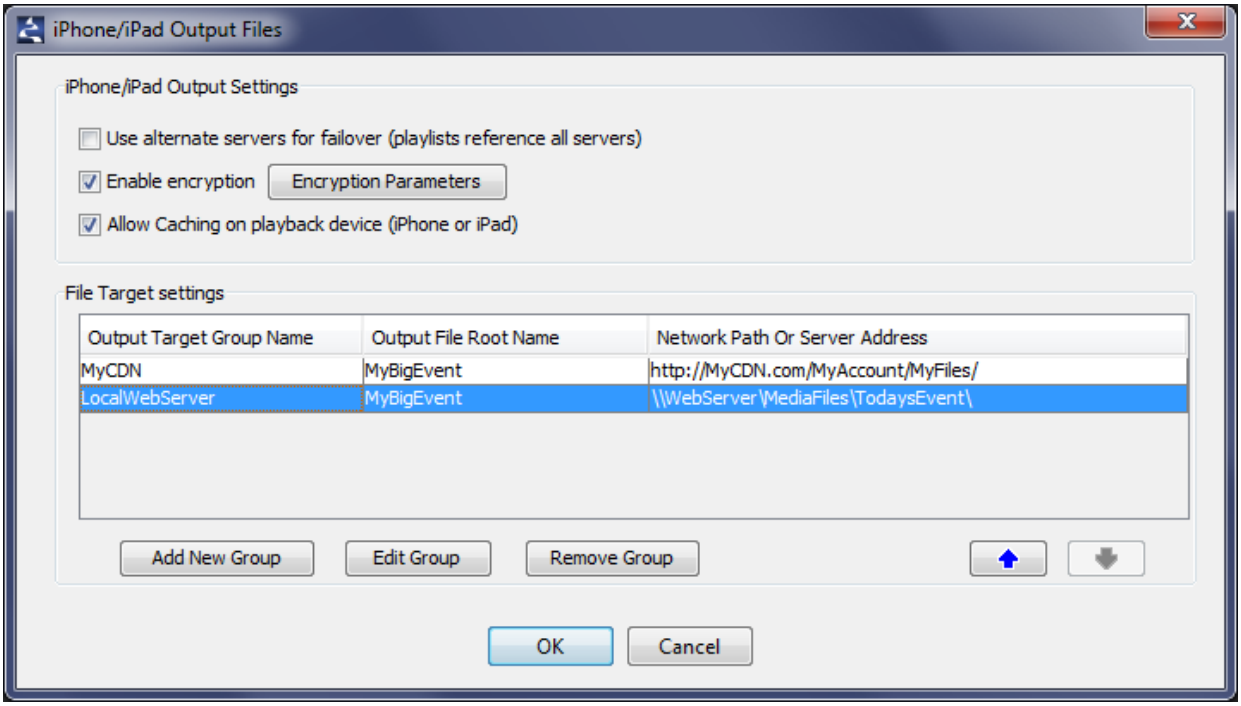
   The *SDK version* is the version of the Nielsen PCM-to-ID3 SDK; the *Vendor ID* is Imagine Communications' Vendor ID with Nielsen; and the *Device Type* number indicates the type of device, for example, 2 is a transcoding device.

5. Click **Apply**.



Output

The Output files from this codec are normally stored on a web server. That web server can be a local server, in which case the files can be written to the specified drive location directly, or it can be a remote HTTP web server in which case the files will be written to a local drive temporarily and then moved to the HTTP web server using HTTP Post. When HTTP Post is used the default HTTP port will be used (port 80).



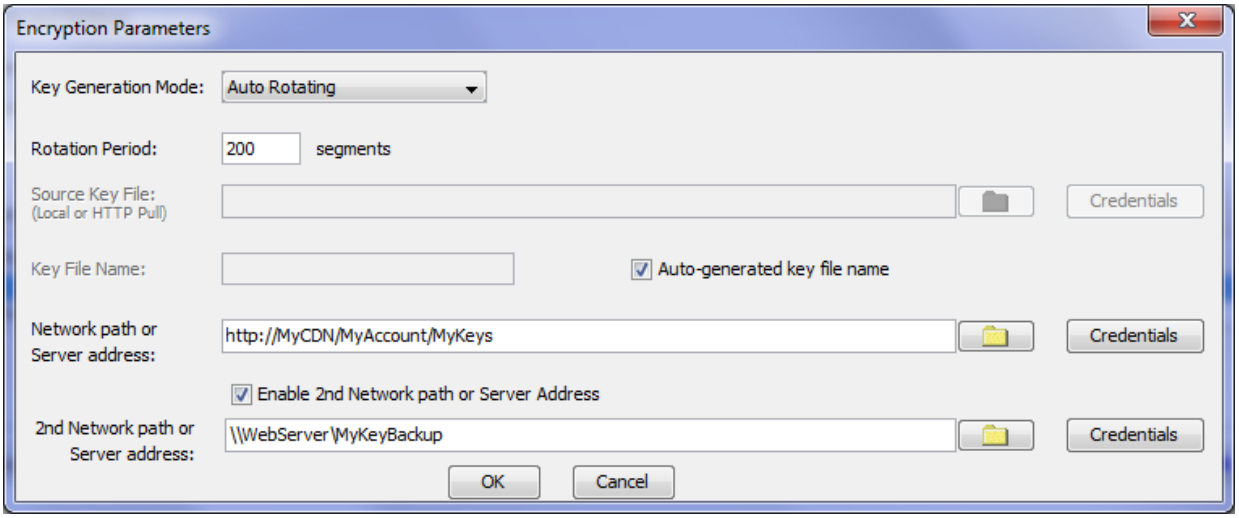
The output files from this codec will be sent to one or more Output Target Groups. Each group specifies the location to send the files, and the location that end users will use when they are trying to view the files.

Failover: If you set up more than one Output Target Group then you can enable the "Use alternate servers for failover" option. When this is enabled the playlists (the m3u8 index files) will reference all servers, and if one server is unavailable the player will be able to request the files from the other servers in the playlist. When this option is not enabled each playlist will only reference its own server.

Caching: When 'Allow Caching' is enabled then segment file storage (caching) will be allowed on the playback device. If there are unstable network conditions then caching may result in better playback reliability. However, if the encode is stopped and then restarted and the output file name is not changed then older cached segments will still be present on the playback device and may be played instead of the newly created segments.

Ecryption: If you check the "Enable encryption" option then the transport stream segments (the media files) will be encrypted using an AES-128 CBC key and the player will have to obtain the encryption key before it will be able to decode the media.

Once "Enable encryption" is checked the Encryption Parameters button will be enabled. Click this button to select the Encryption Parameters.



Key Generation Mode:

- License Server Generated: A key that has been generated by a license server will be loaded by the SelenioFlex Ingest software. This is used primarily for testing.
- Auto Rotating: A series of keys will be generated by the SelenioFlex Ingest software.
- Auto Generated: A single key will be generated by the SelenioFlex Ingest software for each encode.
- SecureMedia: A key will be downloaded from a SecureMedia key server.
- SecureMedia Auto Rotating: Keys will be downloaded from a SecureMedia key server at the interval that you set in the Rotation Period.

Rotation Period: This is only active when using the Auto Rotating mode. Specify the period (the number of Transport Stream segments) before generating a new key.

Source Key File: This is active when using the SecureMedia modes or the License Server Generated mode. This allows you to specify the location of the key file. If you enter a path that uses a local or network drive then the encoder will use a regular file read to get the file. If you enter an HTTP location then an HTTP Pull will be used to get the file.

You can also specify the Credentials needed to access a file on an HTTP server (login/password) or on an Akamai server (Token Query Value/Token Salt Value).

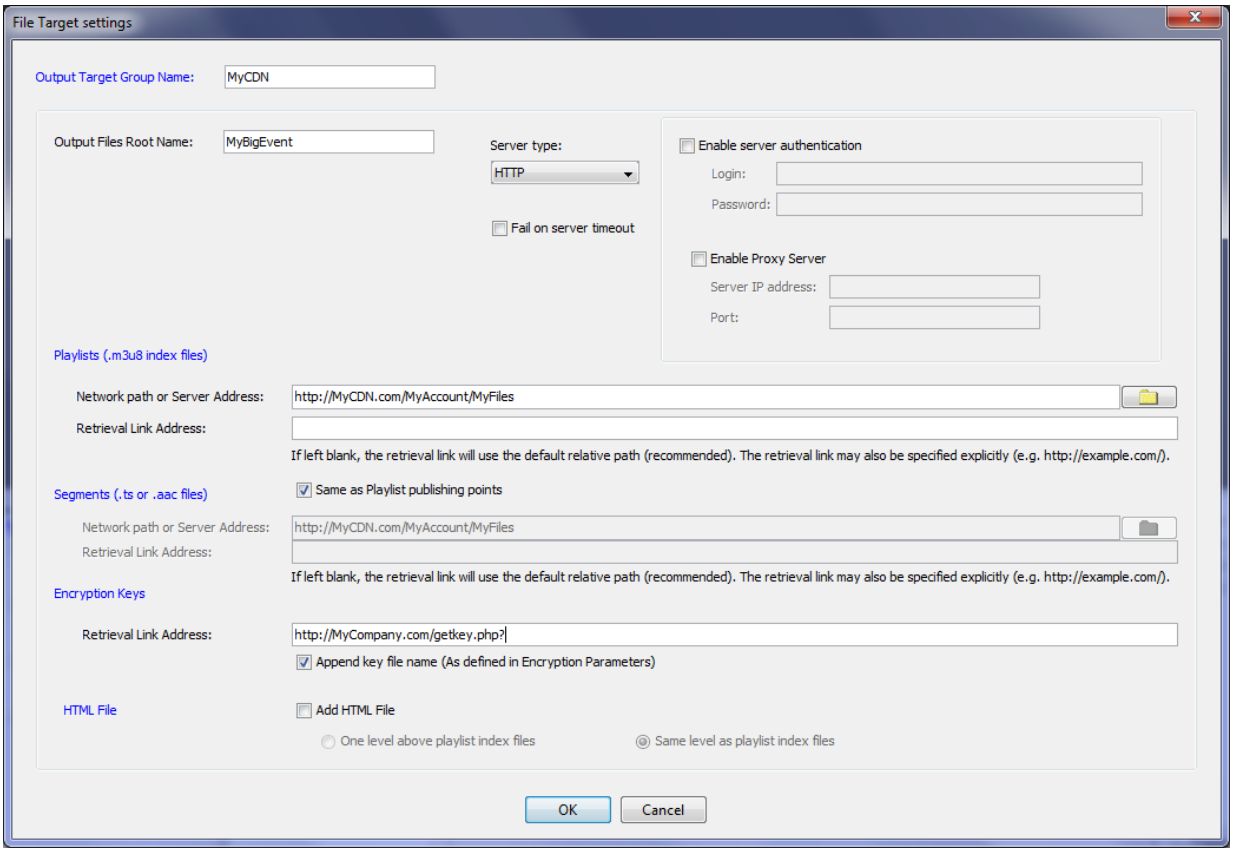
Key File Name: This is only active when using the Auto Generated or Auto Rotating modes. You can either specify a name for auto generated key names or you can enable the "Auto-generated key file name" option.

Network path or Server address: Specify the file location where the key files will be stored. If this is a local or network drive the key will use a normal file write, if it is an HTTP location then HTTP Post will be used. You can also specify the Credentials needed to write a file to an HTTP server (login/password) or to an Akamai server (Token Query Value/Token Salt Value).

2nd Network path or Server address: You can give a second location for the key files. For example, if you are writing the files to your CDN you may want to also store them on a local drive for backup.

File Target Settings

Click on the Add New Group button to add output settings for your files.


File Target settings
Output Target Group Name:
MyCDN
Output Files Root Name:
MyBigEvent
Server type:
HTTP
Fail on server timeout
Enable server authentication
Login:
Password:
Enable Proxy Server
Server IP address:
Port:
Playlists (.m3u8 index files)
Network path or Server Address:
http://MyCDN.com/MyAccount/MyFiles
Retrieval Link Address:
If left blank, the retrieval link will use the default relative path (recommended). The retrieval link may also be specified explicitly (e.g. http://example.com/).
Segments (.ts or .aac files)
Same as Playlist publishing points
Network path or Server Address:
http://MyCDN.com/MyAccount/MyFiles
Retrieval Link Address:
If left blank, the retrieval link will use the default relative path (recommended). The retrieval link may also be specified explicitly (e.g. http://example.com/).
Encryption Keys
Retrieval Link Address:
http://MyCompany.com/getkey.php?
Append key file name (As defined in Encryption Parameters)
HTML File
Add HTML File
One level above playlist index files
Same level as playlist index files
OK
Cancel

Output Target Group Name: The name used to refer to this group of settings.

Output Files Root Name: The Output Files Root Name you specify will be used by the playlist files. That means that this name will be visible to the viewer, so use a name that you want viewers to see when they play the media. It will also be used to name the Layer folders, as the first part of the folder name (e.g., MyName_Layer1).

Server Type: Pick HTTP, Akamai, FTP or Local Network. Then specify the credentials needed to write a file to the server (if required).

- **HTTP:** Choose whether or not to enable server authentication, and if it is enabled then enter the login and password. A proxy server can optionally be enabled.
- **Akamai:** Choose whether or not to enable server authentication, and if it is enabled then enter the Token Query Value and Token Salt Value. A proxy server can optionally be enabled.
- **FTP:** Choose whether or not to enable server authentication, and if it is enabled then enter the login and password. You can also choose the FTP port and whether or not you are using Active FTP (as opposed to Passive FTP).
- **Local Network:** Choose this option when your server is on the local network.

Fail on server timeout: If the SelenioFlex Ingest software cannot connect to the file storage location (Network path or Server address) this option will tell the encoder whether the encode should fail (stop encoding) or whether it should continue encoding despite the loss of connectivity.

Playlists – Network path or Server address: This is the file storage location for the playlist files. If this location starts with HTTP then the files will be written to a temporary local folder and then HTTP Post will be used to move the files. If the location is a local or network drive then the file will simply be written to the specified location.

Playlists – Retrieval Link Address: This is the text written into the master playlist files which is used by the player to retrieve layer playlist files.

By default the master playlist files and the layer playlist files will be written into the same directory. If you do not plan to move the layer playlist files to a different directory relative to the master playlist files then you should leave this field blank.

If you do plan to move your layer playlist files to a different directory then you can enter the relative path to the new directory, or you can enter an http address that can be used to access the new directory.

Segments: The segments will normally use the same Network path or Server address and Retrieval Link address as the Playlists. If your setup requires a different location then you can disable the checkbox so that you can specify different locations.

The Retrieval Link Address for Segments is the text written into the layer playlist files which is used by the player to retrieve segments. As with the Playlist Retrieval Link Address, if you do not plan to move the segments from their default directories then you can leave this field blank.

Encryption Keys: If you enabled the Encryption option then the key Retrieval Link Address will be enabled. This is the text written into the layer playlist files which is used by the player to retrieve keys for decryption.

The "Append key file name" option can be used if you are pointing to the folder that contains your encryption keys and you want the key name to be automatically written into the m3u8 file.

Normally you will not want the playlist to point directly to the keys, but instead will want to point to a script which can be used to check that a user is authorized to obtain the key before delivering the appropriate key. This can be accomplished using one of the popular web application technologies (such as ASP.NET, JSP or PHP). If you take this approach then the Key Retrieval Link Address will be the location of the script which will be run to obtain the key (for example, https://serverhost/iPhoneEvent/getkey.php). When you are using this method, be sure to disable the "Append key file name" option.

For example, here is a sample php script that could be used to check that the user passed a validation check, and if so then retrieve the key (MySecret.key).

```
<?php
$isValid = true;
if (! $isValid)
{
   header('HTTP/1.0 403 Forbidden');
}
else
{
   header('Content-Type: binary/octet-stream');
   header('Pragma: no-cache');
   $myFile = "https://www.MyServer.com/iPhone/MySecret.key";
   $fh = fopen($myFile, 'r');
   $theData = fgets($fh);
   fclose($fh);
   echo $theData;
   exit(); // this is needed to ensure cr/lf is not added to output
}
?>
```

Note that the key files storage location (Network path or Server address) is specified in the Encryption Parameters settings.

HTML File: The encoder can create an HTML file that can be used by a player to open the m3u8 index file to initiate playback. If you do choose to create an HTML file you can also specify if the file should be at the same directory level as the playlist index files or one level above that.

CDN Tips

If you are using an account hosted by a CDN they will give you an upload hostname and upload folder.

You may also want to create an upload folder on the web server for the iPhone encode before you begin encoding. For example:

Upload hostname (provided by CDN): iphone.cdn.com.edgesuite.net
Upload folders (provided by CDN): /mycompany* and /auth/mycompany*
(where authorization is required for the /auth* folder)

When you are encoding you will normally direct the output of each encode session to a subfolder of the upload folder provided by the CDN. You do not need to create the subfolder before you start encoding as the SelenioFlex Ingest software will create the subfolder.

For example, if your upload folder was http://iphone.cdn.com.edgesuite.net/mycompany and you in the Output settings in the "Network path or Server address" field you specified http://iphone.cdn.com.edgesuite.net/mycompany/myevent, then the subfolder "myevent" would be created by the SelenioFlex Ingest software.

Player Considerations

iPhone and iPod touch requires iPhone OS version 3.0 or later.

QuickTime X can also play HTTP Live Streams, enabling playback on the MAC desktop.

QuickTime X comes embedded in MAC OS X Snow Leopard and higher.

Using QuickTime X you can access the master playlist file for playback.

You can also play the content by accessing the playlist URL in Safari from a MAC with QuickTime X.

Web Server Considerations

Check to make sure that the MIME types have been set properly on the Web Server.

.m3u8	application/x-mpegURL (for the playlists)
.ts	video/MP2T (for the video/audio segments)
.aac	audio/aac (for the audio only segments)
.key	application/octet-stream (for the encryption keys)

Ensure that the server does not cache the playlist file (m3u8 index file) when it is accessed. If the playlist file is cached it will cause the file to lock the first time the playback device requests the playlist, which will cause the encode to abort.

For example, for the Microsoft IIS server this article shows how to turn off caching by folder: http://support.microsoft.com/kb/247389